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TWO INTERESTING MAYFLY NYMPHS WITH A DESCRIPTION OF A NEW SPECIES

BY HERMAN T. SPIETH[1]

An unique ephemerid nymph was collected by Stacey Denham in the White River at Decker, Indiana, July 27, 1932. From the structure of the specimen it was hypothesized that other individuals of the species would be found inhabiting sand bars. On June 20, 1936, twenty-five specimens were taken by the author on a sand bar a few miles down river from Decker. These all agree with the previous specimen in every detail except that they are not as mature. The original specimen was in the last instar and the wings were crumpled up inside the wing pads. One of the pads was cut from the specimen, the wing slipped out and uncrumpled as much as possible. It was apparent that the future adult wing was typically oligoneurid in construction and that the Rs would arise from about the middle of the radius. This plus the close similarity of the nymph to that of the European genus *Oligoneuriella* leads me to place this species tentatively in the American genus *Oligoneuria*. Although the adults of these two genera, as well as the nymph of *Oligoneuriella*, have been amply described, the nymph of *Oligoneuria* has never been identified. The description, which appeared in the Jour. N. Y. Ent. Soc., XLV, pp. 139–145, is as follows:

Oligoneuria ammophila, new species

Length, including tails, 12.5 mm.; exclusive of tails, 10 mm. Head roughly semi-globose with the mouth parts projecting postero-ventrally; compound eyes huge, occupying most of the area of the head, and contiguous along the mid-line, thus completely eliminating vertex except for a small area anteriorly. Nymphal eyes undivided; those of the adult as seen through the thin chitin show no indication of being divided. Lateral ocelli wedged between the antennae and compound eyes, being displaced so that they are anterior and ventral to the median ocellus which lies in an angle formed by anterior margins of eyes. Fronto-clypeal area greatly reduced; along edge of this area and the ventral edge of the parietal areas a fairly dense fringe of short setae. Antennae twelve-jointed, short and stubby; scape short and heavy; pedicel almost as heavy and much longer, comprising a third of the total length of the antennae; remaining segments subequal and gradually decreasing in diameter toward the tip.

[1] College of The City of New York.

Mouth parts typically oligoneurid; labrum (Fig. 10) uniformly pilose over the anterior surface; mandibles (Fig. 5) with a large, well-developed molar area, and reduced, smallish incisors, the outer one having three small teeth at tip and the inner one appearing like a huge, sharp-pointed seta; the lacina mobilis as long as outer incisor; maxillae (Fig. 1) with semi-lanceolate galea-lacinia; palps two-jointed; basal segment short and the distal one long, large, curved and finger-like; at the base of maxillae a large tuft of respiratory filaments as in *Oligoneuriella rhenana;* labium (Fig. 4) heavily pilose; glossae small and lying dorsal to the larger paraglossae; palps two-jointed, the second large and broadly expanded.

Thorax short and compact; the anterior and posterior margins of the pronotum straight and parallel. An extension of the postero-lateral area of the pronotum extending as a broad lobe-like projection posterior to the protheracic leg (Fig. 9). Wing pads large, thick and blackish as in all nymphs just before emergence; the metathoracic wings of the adult apparently large.

Legs (Figs. 7 and 8) peculiar in that the coxae and trochanters of the meso- and metathoracic legs are very long and robust. Coxa of fore-leg about three-fourths as long as femur; trochanter small; tibia forming a flat blade-like structure about one and one-half times the length of femur and ending in a blunt semi-hook, on the outer side of which is a small unsegmented papilla-like structure which represents the tarsus; inner side of basal half of femur and middle three-fourths of tibia bearing extremely long slender setae which are secondarily dissected as in *O. rhenana;* a patch of long slender setae on inner surface of coxa; outer surface of coxa, trochanter and femur sparsely setose. Coxa of second leg subequal to femur, longer than any other part and covered with setae on outer surface; trochanter robust and longer than tibia or tarsus, and expanded and rounded on medio-ventral surface, this surface being covered with long robust setae; femur covered with robust setae; tarsus subequal to tibia and both sparsely covered with short setae; tarsus ending in a single slender claw. Coxa of hind leg heavy and long, representing one-third of entire length of leg, and fairly densely covered by long slender setae; short, semi-globose trochanter covered with long slender setae on ventral surface; femur, tibia and tarsus, which decrease in length and robustness in order named, clothed with long, heavy setae; tarsus tipped by long slender claw. Adult legs as seen through the nymphal chitin appearing very slender and weak.

Abdomen long, slender and cylindrical; segments gradually increasing in length and decreasing in diameter from first to ninth inclusive; tenth segment considerably smaller than any other; tergites uniformly covered with short, stubby setae; on anterior sternites setae much denser, longer and finer than on corresponding tergites, with a gradual reduction in density and length of setae on more posterior sternites until ninth sternite matches ninth tergite; in addition a distinct fringe on posterior edge of all sternites due to increased density and length of setae. Through the thin nymphal chitin, it can be seen that the adult would have a broad dark, irregular band on its posterior edge of each abdominal tergite increasing in width posteriorly until that of the ninth segment would occupy almost half of the tergite; no indications of postero-lateral spines on segments 1 to 7 inclusive; lateral spines on segments 8 and 9 short, not extending beyond posterior margin of their respective segments.

Gills present on abdominal segments 1 to 7 inclusive; last six (Figs. 2 and 3) consist of single, slender, flat, plate-like structures which extend postero-laterally from posterior angle of each segment, apparently none having any tracheae; first gill

(Fig. 11) a huge, highly dissected plate-like structure that has migrated and rotated so that it extends ventrally and parallel to the longitudinal axis of the body and lies between the posterior pair of legs. It is completely invisible from a dorsal view and when first seen seems to arise from the thorax; also there is a median, finger-like, posteriorly directed process from posterior edge of first sternite.

Nymphal genital apparatus appearing as a truncate cone with a concave top surface. It is impossible to determine what the adult genitalia would be like. Three subequal caudal tails; lateral ones having a dense fringe of long, slender setae on inner side and a similar fringe on both sides of middle tail; laterals with 25 segments, the middle tail 22.

HOLOTYPE.—Decker, Ind. (White Riv.), July 27, 1932 (Stacey Denham); in collection of the Amer. Mus. Nat. Hist.

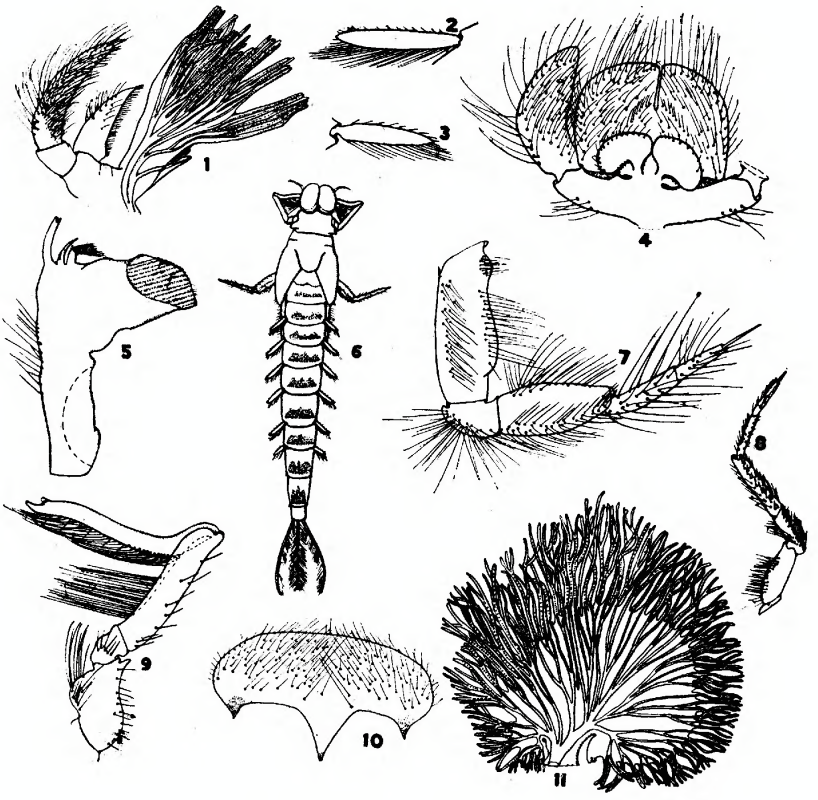
PARATYPES.—Hazelton, Ind. (White Riv.), June 20, 1936 (H. Spieth); 17 in collection of the Amer. Mus. Nat. Hist.; 2 in collection of Cornell Univ.; 2 in Canadian Nat. Coll.; 2 in collection of Univ. of Mich.; 2 in author's collection.

This species is somewhat closely related to *O. rhenana* as shown by (1) the general appearance of the nymph; (2) the head and especially the mouth parts; (3) the position and shape of the fore-leg as well as the disposition and secondary dissection of the setae on the fore-femur and tibia; (4) the location of the first gill on the ventral surface of the abdomen. It differs from *O. rhenana* in that (1) the fore-leg has a rudimentary tarsus; (2) the first gill has completely lost the lamellae and (3) the last six gills lack the fibrillar portion.

The paratypes were all found on the clean sand of a bar in about one foot of water. The current was moderately swift. In addition to *O. ammophila* a species of *Brachycerus* was found in abundance on the same bar. Both species occupied distinct areas and the ranges barely overlapped. *O. ammophila* was found in the swifter current and the bottom was not smooth but rather filled with a great many small depressions. The sand was clean and lacked any trace of silt. *Brachycerus* selected calmer, smoother areas where a small amount of silt was mixed with the sand.

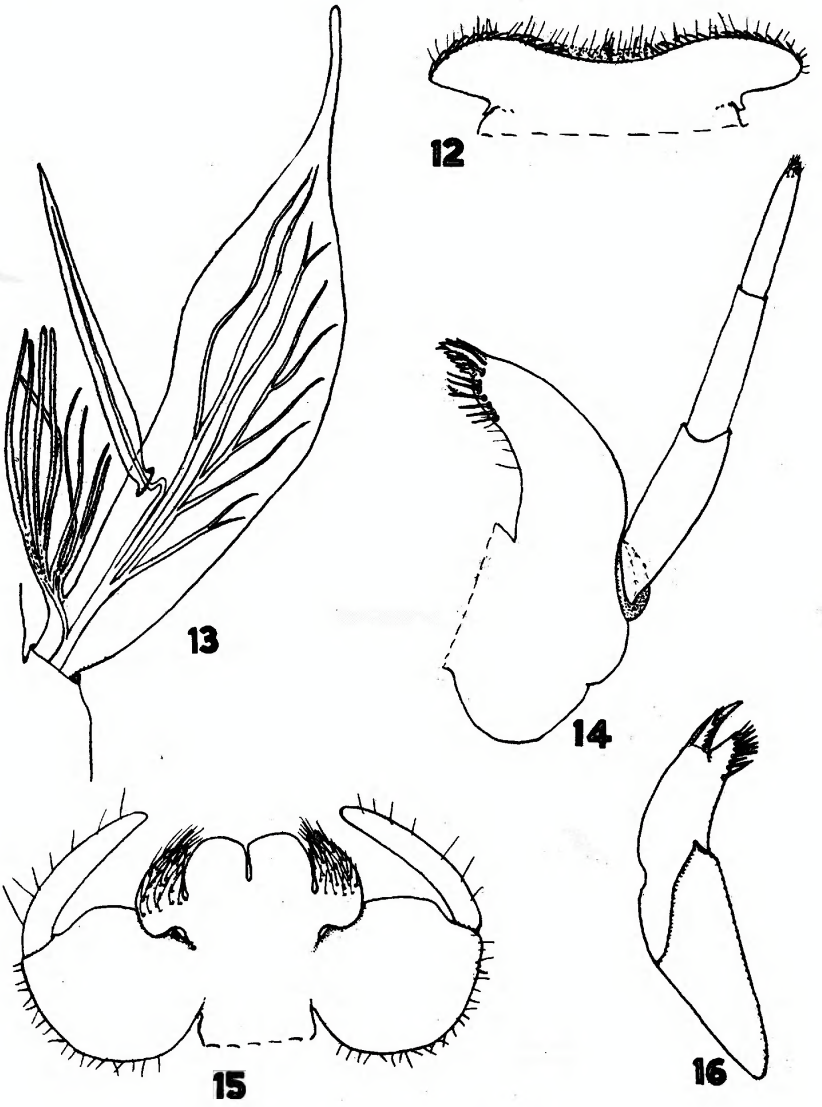
While collecting *O. ammophila*, a single specimen of an unknown genus was taken. Despite intensive attempts, no more individuals of this species were found. It is so extraordinary, however, that it deserves description, which is as follows:

The specimen, a female, is apparently in early phase of last instar. The future venation of adult is clearly discernible in nymphal wing pad. Length, exclusive of tails, 13 mm. Head depressed, heptagenid in construction except that (1) the fronto-clypeal area, especially between antennae, is elevated; (2) the compound eyes are more anterior from the posterior margin than usual. From dorsal view head is



Oligoneuria ammophila, new species.

Fig. 1. Right maxilla.
Fig. 2. Second gill.
Fig. 3. Seventh gill.
Fig. 4. Labium.
Fig. 5. Right mandible.
Fig. 6. Dorsal view of nymph
Fig. 7. Metathoracic leg.
Fig. 8. Mesothoracic leg.
Fig. 9. Prothoracic leg.
Fig. 10. Labrum.



New carnivorous heptagenid.

Fig. 11. First gill.
Fig. 12. Labrum.
Fig. 13. Sixth gill—ventral view.
Fig. 14. Left maxilla.
Fig. 15. Labium.
Fig. 16. Right mandible.

bowl-shaped in outline and widest near posterior border. Antennae arise from side of elevated area; scape and pedicel subequal in size; both flagella broken and lost.

Labrum (Fig. 12) broadly expanded laterally, slightly concave on anterior margin, outer surface sparsely setose and a row of setae on anterior margin. Mandibles (Fig. 16) slender, lacking molar area, while robust incisors consist of single huge fang with secondary tooth arising laterally; the lacina a huge seta, serrate along one side. Median to the lacinia mobilis is a cone-shaped projection bearing 11–13 robust setae. Maxillae (Fig. 14) slender, with distal end of galea-lacinia bearing three slender fangs, medial one of which is a large body representing a seta that is flattened, broadened and laterally serrate. Still more median to this are a number of robust setae. Palps three-jointed. All mouth parts and especially the mandibles and maxillae conspicuous for their lack of pilosity. Labium (Fig. 15) with short rounded naked glossae; paraglossae lateral, arising postero-laterally from glossae and having a slight posterior lobe reminiscent of the heptagenids; palps two-jointed, basal segment broad, flattened and sparsely pilose on posterior margin; second joint is slender and cylindrical.

Prothorax broad, flaring laterally with postero-lateral extensions extending alongside of wing base. Median to this extension on posterior margin is a large, deep, somewhat rectangular incision. Meso- and metathorax short and broad. Mesothoracic wing pads extending to middle of fourth abdominal segment; venation clearly heptagenid. All legs similar; femur slender, much flattened, naked except for anterior edge which is densely covered with long slender setae; femur slightly longer than tibia and tarsus combined; latter two slender, and naked except for few setae at distal tip of tarsus; tarsus subequal to tibia; single long, slender, smooth tarsal claw which is subequal to tarsus in length.

Abdomen slender, moderately flattened; gills on segments 1–7 inclusive; no postero-lateral spines except extremely small ones on segments 8 and 9; general ground color cream, with tergite 8 completely light chocolate and dark median marks at anterior edge of second, third, sixth and seventh tergites. In addition a slight infuscation at antero-lateral areas of tergites 3, 4, 5, 6 and 7; ninth sternite deeply incised on posterior margin. Gills (Fig. 13) except for first one, compound, consisting of a lanceolate lamella and a fibrillar portion; first gill of fibrillar portion only lacking lamella. Each lamella has, in addition to fibrillar portion, a narrow, slender, flattened projection arising from ventral surface at about one-third of the distance from the base of the lamella. A branch of the lamellar trachea supplies this projection.

Tails three; unfortunately tips of all are broken; lateral ones with dense band of slender setae on inner side; middle tail with setae on both sides; middle one under normal conditions obviously much shorter than laterals.

Collected at Hazelton, Ind. (White Riv.), June 20, 1936 (H. Spieth). Specimen in the collection of the Amer. Mus. Nat. Hist.

The complete lack of the molar area of the mandibles, the fang-like condition of the incisors plus the fang on the galea-lacinia of the maxilla indicate that this species must be a carnivore. This is further confirmed by the slender build and immaculate condition of the speci-

men which indicate it is an active, agile creature. In addition, although it was taken from a swift current it possesses no structures such as *Isonychia* or *Oligoneuria* have for filtering micro-organisms from the water.

The construction of the head and gills alone would be sufficient to identify this species as a heptagenid. The fact that the future adult venation can be determined serves as positive confirmation. There is no doubt that the species is a member of a genus of which the nymph is unknown. Whether it is a member of a completely new genus or of a genus whose adult is known but whose nymph has not yet been identified is the next question. Since the genera of the family Heptageniidae are as a group fairly well known, it appears unlikely that this nymph represents a new genus. In the Mississippi Valley exists the genus *Pseudiron* known from two species represented as yet only by imagoes, and it is possible that the present specimen is a nymph of *Pseudiron*. The facts that the ninth abdominal sternite of the nymph has a deep V-shaped incision on the posterior margin and that a similar condition exists in the imagoes of *Pseudiron* seem to be evidence pointing to such a conclusion.